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the lower grade represented by the homogeneous food-yelk with a cortical layer, and possessed of rhythmic contractility, passing into the higher represented by the formative yelk of a granular structure, and possessed of a fissile contractile property only.

IX. "Variations in Human Myology observed during the Winter Session of 1865-66 at King's College, London." By JOHN WOOD, F.R.C.S., Demonstrator of Anatomy. Communicated by Dr. SHARPEY. Received May 3, 1866.

In the present paper are given the results of observations, made with the greatest possible accuracy and care, of the muscular anatomy of thirty-four subjects, chiefly of the male sex, with an especial view to the study of the *combinations* of these abnormalities, and the directions in which they chiefly tend. To enable the reader more readily to comprehend these results, the author has tabulated them in the sheet appended to the paper. In the Table the names of the muscles placed at the head of each column refer to those in which more than one variety has been observed in the session. They will be found to correspond very closely with those given in the former papers by the author. In columns 4, 21, and 27 are placed those of which only one example has been met with. Some of these, however, are of much importance.

To explain the nature of the abnormality more precisely than could be done in the Table, a word or two will be necessary on such of the specimens as may be considered novel or typical.

Four columns are occupied by variations of the *head* and *neck*, the examples of which amount in the aggregate to twenty-two; some of the muscles in these may, however, strictly be considered as muscles also of the upper extremity, especially those in col. 3, which I have denominated *cleido-occipital*.

Col. 1. *Platysma myoides*.—The first of the two varieties noted (in subject 20) was connected with the inner side of the lower end of the normal muscle, the fibres passing in a broad band downwards and inwards, over the origin of the *sterno-cleido-mastoid*, the clavicle, and upper fibres of the *pectoralis major* to be inserted into the fascia covering the sternum as far down as the third costal cartilage.

The second (subject 29) was connected internally with the sternal fascia between the second and third costal cartilages, and crossing obliquely outwards and downwards over the lower fibres of the *pectoralis major* and axillary cavity, became attached to the tendon of the *latissimus dorsi*, exactly as we find its homologue, the *panniculus carnosus*, to do in the lower animals. This variety of the *Platysma* does not appear to have been previously recorded.

2. *Digastric*.—The two varieties of this muscle were found, as usual, in the anterior belly, which was double. In the first (No. 1) the redundant belly was attached by the median raphé to the one on the other side, and

was implanted upon the tendon in the usual manner. The second decussated with its fellow on the opposite side, and each became attached to a part of the digastric fossa on the opposite half of the mandible, as given in the author's first paper, and described by Henle and other anatomists.

3. *Cleido-occipital*.—The author has ventured to bestow this name upon a muscle which proved, when looked after, to be so common that not less than eleven specimens were found out of the thirty-four subjects. It will be best understood by reference to fig. 7 *a*, in the subject of which it was found in conjunction with a *sternoclavicular* muscle. It is placed along the hinder border of the *sterno-cleido-mastoideus*, usually separated, however, by a distinct areolar interval from both the sternal and clavicular fibres of this muscle. It is attached below to the junction of the inner and middle thirds of the upper border of the clavicle, and above to the superior curved line of the occipital bone, close to the origin of the *trapezius* muscle. It is described by Meckel (*Handbuch der mensch. Anatomie*, 1816, p. 474) as an *accessory* to the *sterno-cleido-mastoid* sometimes met with. It may be considered as a lateral extension and separation of part of the clavicular fibres of the *sterno-cleido-mastoid*, which, in the normal arrangement, are crossed and entirely covered at the upper part by the sternal portion, and do not extend at their insertion beyond the mastoid portion of the temporal bone. The author has found that in the Guinea-pig and some other Rodents it constitutes a separate muscle, entirely distinct from the *sterno-mastoid*, carrying with it the whole of the clavicular fibres of the *sterno-cleido-mastoideus*. In the Dog and Cat, and probably in the other Carnivora, it forms part of the long muscle, the *cephalo-humeral*. In these animals the *cleido-mastoid* is a distinct muscle, joining with the *cephalo-humeral* at the rudimentary clavicle. In the Hedgehog, on the other hand, the *cleido-mastoid* is blended with the *sterno-mastoid*, while the *cleido-occipital* is placed as a distinct muscle behind it. In the Apes and Monkeys it is always present, but continuous with the hinder border of the true *sterno-cleido-mastoid*, with a more or less distinct intermuscular space*. The above peculiarities of its comparative anatomy, and the fact of its separate attachment to the occipital bone, instead of the mastoid portion of the temporal bone, have induced the author to propose the name here given to it.

4. Of the single specimens in this column the *levator claviculæ* was in most respects the counterpart to that given in the author's last paper; but it was found only on the left side, arising from the three upper cervical transverse processes in front of the *levator anguli scapulæ*, and inserted into the outer half of the clavicle, behind the anterior fibres of the *trapezius*. On the opposite side it was not found, but a very distinct *cleido-occipital* was present. This again was not found on the left side, but appeared to supply the place of the *levator claviculæ*. The *costo-fascialis cervicalis*, of subject 28, was in every respect like those described in the

* Meckel describes, in the Marmot, the Squirrel, and some other Rodents, and in some Marsupials, two *cleido-mastoids*, of which the hinder corresponds entirely to the muscle here called *cleido-occipital* (*Anatomie Compar.* 1829–30, vol. vi. p. 163).

author's two last papers. The *sternalis brutorum* was a small development on the right side only, reaching from the third to the sixth costal cartilage. The rest of the muscles in this column scarcely need a more extended description than is there found.

No less than seventeen out of the twenty-seven columns denoting the different kinds of variety are occupied by those of the *arm*, of which there are seventy-one examples.

5. Epigastric slips of the *pectoralis major* presented various degrees of development of the so-called *chondro-epitrochlear* muscle of the Apes and Monkeys, but reaching only as far as the insertion of the rest of that muscle into the bicipital ridge, and terminating distinctly from it. None of them were so complete in their development as those described in the author's first paper. One specimen is seen in fig. 1 *a*, in significant combination with the ape-like variation placed in the next column.

6. The developments of the *pectoralis minor* given in this column are such as may easily be overlooked, but when closely sought for, as in the last session, have yielded no less than five specimens out of thirty-four subjects. The variety consists in the prolongation of the tendon of insertion as a flat tendinous slip, sometimes connected with a large portion of the muscular fibres, over the upper surface of the coracoid process, which is grooved distinctly for its reception. This tendon then joins that of the *supraspinatus* muscle, and blending with it and the capsular ligament, is implanted into the upper facet of the greater tuberosity of the humerus (see fig. 1 *b*). In the subject of the sketch (a female) another tendinous slip was directed upwards and outwards, and lost upon the coraco-acromial ligament. The insertion of the *pectoralis minor* into the shoulder-joint capsule is mentioned by Meckel (*op. cit.* p. 467), giving Gantzer as his authority*. This prolongation of the tendon to the humerus reaches to a greater extent in the Monkeys in proportion to the diminution in size of the coracoid process. In the Carnivora it is entirely inserted into the greater tuberosity, and blends more or less intimately with the *pectoralis major*. In subject 22 the upward direction of the insertion of the *pectoralis minor* becomes more marked as an insertion of the upper muscular fibres into the costo-coracoid membrane and the clavicle itself. The origin of the muscle was in this case higher than usual, reaching to the first intercostal aponeurosis. This upward development of the *pectoralis minor* is an approximation to the condition of its insertion in the Rodents, and, as the author believes, is a formation identical with the *sternoclavicular* muscle, and found in subject 27, column 21 (fig. 7).

7. In this column are given two opposite tendencies of development of the *latissimus dorsi*. Of the first are those not uncommon slips of communication between this muscle and the insertion of the *pectoralis major*, passing in front of the axillary vessels and nerves (see fig. 1 *c*), described by Meckel, Langer, and Gruber (*Achselbogen*). The author re-

* De Souza describes a case in which the whole of the *pectoralis minor* was inserted into the capsule of the shoulder-joint (*Gazette Médicale*, 1855, No. 12).

Fig. 1.—Subject No. 5.

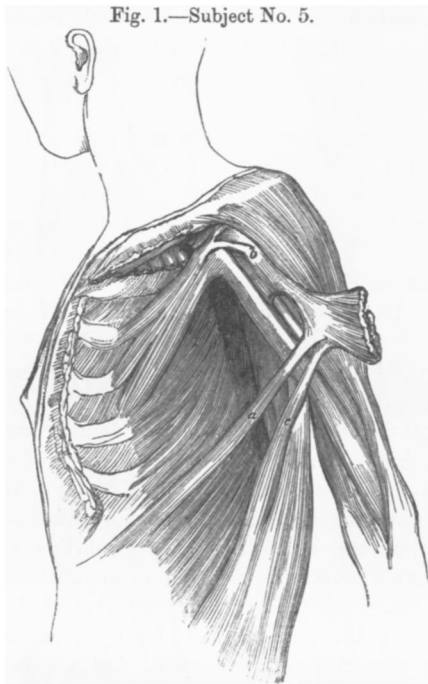


Fig. 2.—Subject No. 10.

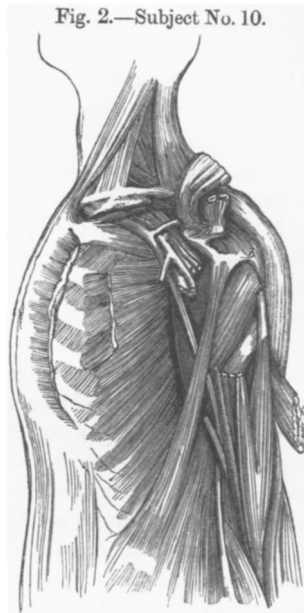


Fig. 5.—Subject No. 9.



Fig. 7.—Subject No. 27.

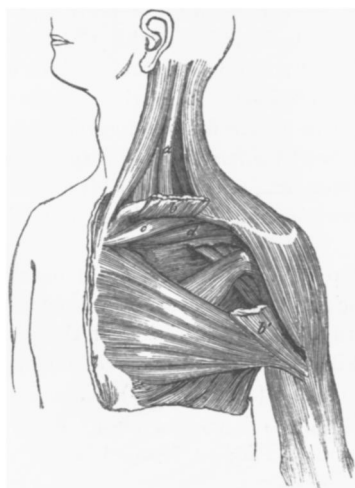


Fig. 3.—Subject No. 32. Fig. 4.—Subject No. 21. Fig. 6.—Subject No. 32.

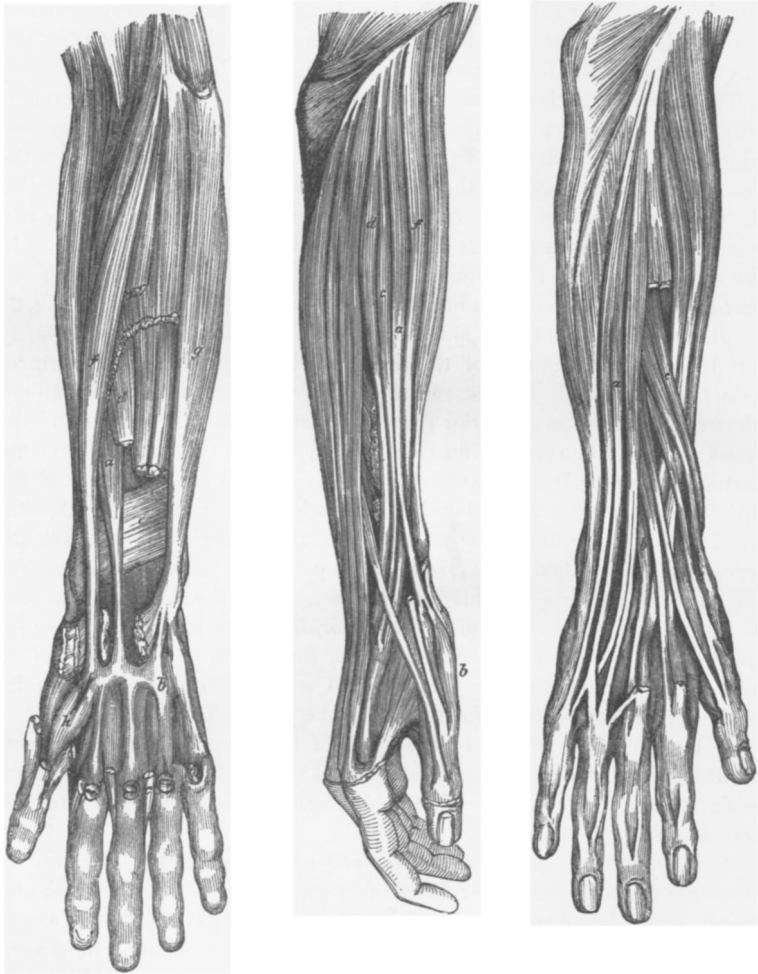
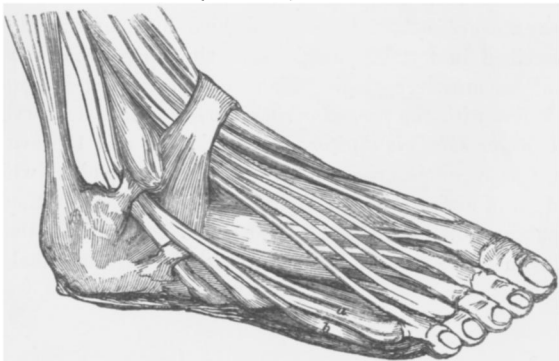


Fig. 8.—Subject No. 7.



gards these as imperfect developments of the so-called *dorsi-epitrochlear* muscle of the lower animals. None have been found this session extensively developed, and these only in three subjects, of which the last (No. 32) was one remarkable for the number of its muscular abnormalities.

The other varieties found were two specimens of the remarkable offset sent from the *latissimus* upwards towards the coracoid process, which the author described in his paper read two years ago to the Society, under the name of the *chondro-coracoid* muscle. It arises with the upper costal fibres of the *latissimus* from the ninth and tenth rib-cartilages, ascending so as to cross the axillary cavity obliquely outwards. In the specimen figured in the author's first series it was inserted with the *pectoralis minor* into the tip of the coracoid process. In subject 10 (fig. 2) it is inserted partly into the lower surface of that process (*a*), and partly into the capsular ligament of the shoulder with the tendon of the *supraspinatus* (*b*). It will be observed to pass between the trunks of the axillary plexus, separating the posterior from the lateral cords. The latter and the vessels are cut to show the muscle. In subject 28 this muscle was connected with the origin of the *coraco-brachialis*, and passed with it to the tip of the coracoid. A similar slip of muscle, passing from the 5th, 6th, and 7th ribs to the muscles connected with the coracoid process, was observed by Theile (*Jourdan's Translation*, p. 204). In all the specimens the unvarying origin of this curious slip, and its relation to the one which joins with the insertion of the *pectoralis major*, and to the *chondro-epitrochlear* muscle of the lower animals, show it to be the result of an upward displacement of the same typical structure, ranging from the insertion of the *pectoralis major* to that of the *pectoralis minor*.

8. The increased number of the heads of the *biceps* in the two subjects in this column were of the more usual kind described by Meckel and others, arising from the fibres of the *brachialis anticus* and from the greater tuberosity of the humerus.

9. In subjects 14 and 17 the *brachialis anticus* presented a continuity of a large portion of its outer fibres of origin into those of the *supinator longus*, which is not uncommon, although not, as far as the author is aware, previously noted in the human subject. It is a very common arrangement in the Apes and Monkeys, assisting them very materially in climbing and twisting the body while hanging by the anterior extremities. In subject 30 there was a *brachio-fascialis* or quasi-third head of the *biceps*, similar to that described in former papers. On the opposite arm was found a curious fusiform muscle, springing high up from the *brachialis anticus*, and connected below with the *pronator radii teres* towards its insertion.

10. The *flexor sublimis digitorum* in subjects 5 and 13 gave off on the outer side of its coronoid origin a separate slender tendon, which became the sole origin of a *first lumbricalis* muscle. In both, another *first lumbricalis* was given off from the usual place on the indicial tendon of the *perforans*. In No. 13 also a curious division of the abnormal *lumbricalis*

occurred, into two parts, of which the innermost was implanted upon the tendon of the *perforatus*, near its division within the sheath of the index finger; while the outermost joined the normal *lumbricalis* near its usual place of insertion. Higher up in the arm another muscular slip connected the redundant tendon from the *sublimis* with the indicial tendon of the *profundus*. In subject 9 was a muscular connexion of the *flexor sublimis* with the origin of the *flexor longus pollicis*, like that described in the last paper.

11. The variations of the *flexor profundus digitorum* in three subjects consisted merely in a not uncommon distinct and superficial muscular origin from the coronoid process along with the fibres of the *sublimis*, such as is frequently met with in the lower animals. In subject 8 was found a tendon connecting the indicial part of the *flexor profundus* with the tendon of the *flexor longus pollicis*. In subject 20 this arrangement was reversed, the tendon going from the *flexor pollicis* above to the *flexor profundus* below. This variety is found in the next column.

12. In addition to the variety just mentioned the *flexor pollicis longus* gives, in subject 2, a tendon to the *first lumbricalis* on both sides.

13. The *lumbricales* have been found irregular in three other subjects besides those just mentioned, in which the *first* was seen to arise from the *flexor sublimis* and *flexor longus pollicis*. In subject 5 the *third lumbricalis* on the right arm was bifurcated, one half going to the ulnar side of the middle finger and the other to the radial side of the ring finger. Both sides of the long finger were thus provided with this muscle, an arrangement which was repeated in both the hands of the 22nd subject. On the right arm of the 32nd subject the whole of the *third lumbricalis* (see fig. 3 c) was inserted into the inner side of the long finger, while the *fourth* was entirely absent. This was also the case with the left arm of subject 5.

14. The name at the head of this column—*flexor carpi radialis brevis*—I have applied to a muscle which is given in fig. 3 a, drawn from subject 32. This subject was, from the number and character of its varieties, the most remarkable of the whole. In this case the muscle arises from the middle third of the front surface of the radius, between the *flexor longus pollicis* above (d) and the *pronator quadratus* (c) below. Passing under the annular ligament as a distinct rounded tendon, close to the carpal bones, inside of and parallel with the sheath of the tendon of the *flexor carpi radialis* (f), it is inserted partly into the os magnum, but chiefly into the base of the middle metacarpal bone, where it gave attachment to some fibres of the *flexor brevis pollicis* muscle. It is evidently a flexor of the third metacarpal bone, corresponding to the *flexor carpi radialis* of the second metacarpal. During the last session a precisely similar muscle was described by Dr. Norton, of St. Mary's Hospital, and exhibited by him at a meeting of the Zoological Society. The subject of figure 3 is further remarkable for a distinct slip of tendon from the *flexor carpi ulnaris* (g) to the base of the fourth metacarpal bone (seen at b). In this arm we

have, therefore, a flexor for each of the metacarpal bones, reckoning the *opponens* as one. But further than this, the outer fibres of the *extensor ossis metacarpi pollicis* in the same arm (see fig. 6 c) are separated from the rest by a cellular interval, and arise partly from the fascia covering the radial extensors and supinator longus. They are connected with a distinct tendon, which is implanted into the front part of the outer border of the base of the first metacarpal bone. Traction upon this tendon showed that its action was rather of the nature of flexion with abduction than of extension. This peculiarity of origin is noticed by Henle (Muskellehre). The arm from which figs. 3 and 6 were taken is now in the custody of the Curator of the Hunterian Museum. In fig. 3 is seen also the abnormal insertion of the *third lumbricalis* (c), the absence of the *fourth*, and at *h* the *first palmar interosseus* of the thumb, described by Henle. In fig. 6 the additional special extensors of the third and fourth fingers are given.

In subjects 13 and 31 were found muscles which are entirely homologous with the *flexor carpi radialis brevis* just described. They had exactly similar origins, were of the same shape and with like tendons, but were inserted into the inner side of the base of the *second* instead of the *third* metacarpal bones, one of them passing, with the tendon of the *flexor carpi radialis*, through the groove in the trapezium and annular ligament, but the other going outside of that sheath.

In subject 6 was found a large fusiform muscle, having its origin from the radius outside of that of the *flexor longus pollicis*, and reaching as high up as the oblique line below the *flexor sublimis*. Ending in a distinct, strong, and rounded tendon, it was implanted into that deeper portion of the annular ligament which separates the groove for the *flexor carpi radialis tendon*, and with this into the trapezoid, magnum, and base of the middle metacarpal bones. A muscle precisely similar to this was described by the author in his last paper (subject 1). Its resemblance in appearance, position, connexions, and influence upon the carpus, have induced him to class it with the foregoing *flexor carpi radialis brevis* as a variation of the same type of muscle, the flexor of the middle metacarpal bone.

15. The variations of the *radial extensors* found in this column are of two kinds, which appear to be closely allied. The first kind mentioned are the interchanging muscles frequently seen and recorded by anatomists. These, arising with one of the twin muscles, pass as distinct tendons over to the other, and become inserted with it. Of these, three were found. In the absence of a name the author has ventured to distinguish this form of muscle by that of the *extensor carpi radialis intermedius*. Of the other kind is found only one example. It is the *extensor carpi radialis accessorius* first recorded, named and described by the author in his former papers*. It has been chosen as the subject of fig. 4, taken from the right arm of subject No. 23, because of its coexistence with the *intermediate* form of the radial extensors, which was not the case in any of the specimens

* This muscle seems to be present in about the proportion of 1 in 35 subjects.

before found. It arises from the condyloid ridge of the humerus, below the *extensor carpi radialis longior* (*f*), lies between that muscle and the *extensor intermedius* (*c*), which separates it from the *extensor carpi radialis brevior* (*d*). It has a distinct tendon of considerable size, which, crossing that of the *longior*, goes through the sheath of the extensors of the metacarpus and first phalanx of the thumb, and divides into two slips, one to be implanted into the base of the *first* metacarpal, and the other to give part origin to a double *abductor pollicis* (*b*). The tendon of the *intermedius* (*c*) can be seen to be implanted upon the *second* metacarpal with that of the *longior*. In the left arm of the same subject only the *intermediate* form was found. The close relation of these two forms is well seen in the figure. The *accessorius* has an origin somewhat similar to the *intermedius*, while its insertion and connexion with the *short abductor* is precisely similar to that often found in the tendon of *extensor ossis metacarpi pollicis*, with which the radial extensors have usually so close a connexion at its origin, as before alluded to in describing the redundancy of that muscle in subject 32 (fig. 6 *c*). If we suppose the germ of an *extensor intermedius* to become blended with that of the upper and outer portion of a double *extensor ossis metacarpi pollicis*, the result would be the *extensor accessorius* here described*.

16. The *extensor carpi ulnaris* in two subjects sent, in both arms, tendinous slips to the little finger, which were blended with the common extensor aponeurosis (fig. 5 *a*). This variety is mentioned by Meckel. Henle considers it as homologous with that of the *peroneus quinti* in the foot. In both subjects the arrangement of the slip was strikingly similar to that of the last-named abnormality, but in neither of them was the *peroneus quinti* found in the foot. In the same arms the *extensor minimi digiti* (*b*) was found provided with two tendons, both inserted, with a slip from the common extensor, into the dorsal aponeurosis of the fifth digit (*c*).

* On looking over Meckel's description of the *extensor ossis metacarpi pollicis*, in reference to this subject, the author finds that he mentions the rare occurrence of a *double-bellied* long *abductor of the thumb*, arising from the outer condyle of the humerus, and inserted into the base of the *first phalanx* of the thumb (*op. cit.* Muskellehre, p. 517). This has evidently been the *extensor carpi radialis accessorius* of the author, passing entirely into the outer head of a double *abductor pollicis brevis*, without any insertion into the metacarpal bone, as found in one of the specimens figured in the author's first series.

In many of the lower animals, and occasionally in the human subject (Henle), the radial extensors are represented by one large muscle, which gives off two tendons to the second and third metacarpal bones respectively. This original connexion seems to be represented by the *intermediate* form of muscle just described. In the Anteater is found a muscle arising from the humerus above the long supinator, and inserted either into the ensiform bone or into the muscular substance of the palm (Meckel, Anatomie Compar., 1829-30, pp. 327-8, vol. vi.). In the *Echidna* and *Ornithorhynchus* a small muscle is found under the common extensor of the 2nd and 3rd metacarpal bones, which is considered by Meckel (*De Ornithorhynco*) to be a *supinator longus*. These may probably be the homologues of this muscle.

17. In three other subjects, besides the two last mentioned, the *extensor minimi digiti* was found to have a double tendon. In one the muscle also was doubled.

In subjects 5 and 32 the outermost of the tendons of this double muscle was inserted into the extensor aponeurosis of the *ring finger*, thus forming a special extensor of this digit (fig. 6 a), joining, before reaching it, with a slip from the common extensor, which directly afterwards again left it, carrying some of its fibres to join the little finger. This arrangement was described by the author in his first paper, and has been also noticed by Vesalius, Meckel, and Hallett in Man, and by Church in the Apes.

18. In this column are found two specimens of that differentiation of the *extensor indicis* muscle which results in a *proper extensor of the middle finger*. In fig. 6 (taken from the extensor aspect of the same arm as fig. 3, subject 32) is seen a complete double set of extensor tendons for each of the five digits, in addition to the interesting varieties found on the flexor side (including a whole set of flexors for the five metacarpal bones), and in other parts of the body. It was not found in the left arm. In subject 13, the *extensor medii digiti* was found in both arms, and, what is significant, it was associated in both with the *flexor carpi radialis brevis* before described, showing a special tendency to development of the muscles of the middle digit. A similar tendency is shown in subject 15, by a duplication of the tendon of the *indicator*, both tendons in this case being inserted into the first digit.

19. Of the *extensor brevis digitorum manus*, described in the author's last papers, fewer examples than usual have been found, none of them very complete. In subject 32 a single slip to the middle finger is found associated with the *proper extensor* and a *flexor of the metacarpal bone* of that digit; a combination which was present also in the remarkable subject (1) described in the last paper, and, with the exception of the *proper extensor*, in one other subject last session. It may be taken as a further proof of the specializing tendency in the middle finger in this subject.

20. Of the *interossei*, five specimens of differentiation are noted, chiefly belonging to the first, or *abductor indicis*. Two specimens of a *palmar interosseus* of the *thumb* are found in Nos. 5 and 32, both presenting numerous other variations.

21. Among the miscellaneous muscles of the arm the most noteworthy specimen is that of a *sternoclavicular* muscle, similar to that described by Haller, and more recently by Mr. Berkeley Hill. This muscle (given in fig. 7 c, from subject 27) arises by a thin tendon from the front of the manubrium sterni, just below the origin of the sterno-mastoid. Spreading as a muscular layer upwards and outwards under the clavicular fibres of the *pectoralis major* (b b', cut and turned up in the figure), it is inserted into the lower border of the clavicle, just in front of the subclavius muscle, from which it is separated by the costo-coracoid membrane (a), extending nearly as far outwards as the origin of the *deltoid*.

This muscle has been found in Birds, Bats, and Moles. The author has also found it remarkably well-developed in the Guinea-pig and some others of the Rodentia. He believes it to be closely allied to the upward extension of the *pectoralis minor*, before alluded to, and to result from a differentiation of such an upward extension. In the subject of the sketch it was associated with a *cleido-occipital (a)*, and with an increase in the number of tendons to the little finger.

In subject 26 was a curious muscular slip extending behind the axillary vessels and nerves, from the insertion of the *subscapular* muscle to the fascia covering the long head of the triceps, and derived from the tendon of the *latissimus dorsi*. Apparently this is an imperfect form of development of a short *coraco-brachialis* muscle, such as that described in a former paper.

In subject 13 was a high fascial origin of the *abductor minimi digiti*, from the lower third of the forearm, like that described and figured in the author's first series. This has been observed by Günther (Chirurgische Muskellehre, Taf. xx. Fig. V. 18).

A double *abductor pollicis brevis* was found in three cases, besides that in which it was connected with a slip from the *extensor carpi radialis accessorius* (given in fig. 4). In subject 23, and also in 32, was a double *extensor ossis metacarpi pollicis*, the tendon of one being inserted entirely into the annular ligament and origin of the *abductor pollicis*.

The rest of this column scarcely needs further description.

The six remaining columns are occupied by abnormalities of the muscles of the leg, of which there are thirty-nine examples.

22. *Peroneus tertius*.—Two out of five anomalies in this column result from the total absence of this characteristically human muscle, giving a very ape-like appearance to the foot. In No. 7 it was absent on the right side only (see fig. 8), in No. 16 on both sides. In subjects 11 and 32 a distinct tendinous slip from it was implanted into the base of the fourth metatarsal. In another, the tendon was doubled, though both were inserted into the fifth metatarsal, spreading towards the fourth.

23. *Peroneus quinti*.—In three out of five specimens found, this tendinous slip from the *peroneus brevis* to the extensor aponeurosis of the little toe was perfect, as described and figured in the last paper. In the remaining two, the tendinous slip from the *brevis*, instead of reaching the toe, became implanted upon the upper border of its metatarsal bone, near the front end (fig. 8 a). In both cases this slip supplied the place of the *peroneus tertius*, which was totally wanting, except in the left foot of subject 7, in which both the slip and the muscle was present, though small. In the subject of the figure the *peroneus brevis* tendon gives also a slip of origin to a bundle of muscular fibres which join the *abductor minimi digiti* as a separate muscle (*b*) on the outer side. This is a somewhat similar arrangement to that of a specimen given in the author's first series, in which the *peroneus quinti* was provided with a separate muscular belly on the outer border of the foot.

24. The *extensor longus primi internodii hallucis*, described in the author's first paper, was found in no less than ten out of the thirty-four subjects, in all, except one, in both legs. In seven the muscles and tendons were fully developed and distinct from the fibres of the *extensor proprius hallucis*, generally arising above, but sometimes below this muscle. In the remaining three (Nos. 11, 19, and 21) the abnormal muscle was represented by a tendon given from the *extensor proprius* near the ankle. In subject 21 this tendon was also, on the right side, contributed to by one from the *extensor longus digitorum*. In all the tendon was attached to the base of the first phalanx of the great toe, close to the joint, either distinct from or in union with that from the *extensor brevis digitorum pedis*.

25. *Flexor longus accessorius*.—The high origin of this muscle, by an additional head from the lower third of the fibula, or from the fascia covering the *flexor longus hallucis*, has been observed in three cases. In all it was provided with a distinct tendon, which joined separately in the union of the long flexor tendons in the middle of the sole. In subject 26 the *flexor accessorius* was made up of four distinct heads. 1. The long head as above described; 2, another tapering fleshy belly from the upper part of the os calcis and insertion of the *plantaris* tendon, in front of the tendo Achillis, and ending in a distinct tendon; 3, the usual "massa carnea" from the hollow surface of the os calcis; and 4, the outer tendinous slip from the long plantar ligament. These all uniting, joined with a large slip from the tendon of the *flexor longus pollicis*, to form a distinct deep or third set of flexor tendons passing to the four outer toes. Each of these joined that of the *perforans* in the inside of the sheath, about the first joint.

26. *Abductor ossis metatarsi quinti*.—This muscle, as described and figured by the author in former papers, was found only in seven subjects this session, in all in both feet. This is much less than the proportion found last session. In two out of the five *females* dissected, they were found well developed, of a fusiform shape, arising from the outer tubercle of the os calcis, and inserted by a distinct rounded tendon into the base of the fifth metacarpal bone. In five *males* only, out of the twenty-nine dissected, were they found as muscles distinct from the fibres of the *abductor minimi digiti*.

In the previous session the proportion of female subjects to males was very much greater than in the last. The specimens of this muscle found were also much more numerous, so much so as to be estimated by the author at nearly half the number of subjects. Whether this remarkable difference depends upon the sex, or is accidental, must be decided by future observations.

27. In the miscellaneous column we have nine single specimens, as compared with eleven or twelve in the arms, and six or seven in the head and neck.

In a female (31) was an areolar separation of the front fibres of the

gluteus minimus forming a *scansorius* muscle, like that described in a former paper. In subject 30 the *perforatus* tendon of the little toe was derived from the *flexor accessorius*, as seen also last session. In subject 7, the same tendon is derived from the fifth tendon of the *perforans*, as found in the Apes and Monkeys. The two last appear to be, respectively, the imperfect or transitional, and the complete stages of this significant change. Two varieties, which I have not found recorded by any anatomical writer, were noticed in subjects 12 and 26. In the former the *abductor hallucis*, and in the latter the *flexor brevis hallucis* sent a considerable muscular slip to the base of the first phalanx of the second toe. In the former the slip passed deeper than the *transversus pedis* muscle, and in the latter superficial to it.

In subject 25 the *third lumbricalis* took origin from the tendon of the *perforatus* instead of the *perforans*, presenting an analogue to the origin of the first *lumbricalis* in the hand from a tendon of the *flexor sublimis perforatus* in subjects 5 and 13.

In subject 2 the fourth *plantar interosseus* arose from a slip of the tendon of the *peroneus longus*, as in the instance described and figured in the author's last paper. In subject 16 was a curious double origin of the *adductor longus femoris*, the abnormal head arising with the fibres of the *pectineus*.

In reference to the combinations of the above muscular variations an inspection of the Table will show the following points:—

First, that only in two subjects out of the thirty-four examined were no muscular abnormalities found; *i. e.* no deviations from the ordinary type sufficiently striking to be recorded. It is, indeed, highly probable that variabilities of every kind are limited only by the possibilities of the permutations and combinations of the whole of the structures of the human body. It will be observed also that the great majority of the abnormalities were *symmetrical*, or found on both sides.

Secondly, that of the total number of muscular variations, 132 (not reckoning both sides when alike), 71, or more than one half, are found in the arms. If we reckon with these those muscles which, though found in the neck, act chiefly upon the clavicle, a bone of the upper extremity, viz. the *cleido-occipital* and the *levator clavicle*, we shall have 12 more to add to the 71, increasing the proportion of the arm muscles, and diminishing those proper to the head and neck to 10. The number of abnormalities in the legs amount to 39, or rather more than half the number of those in the arms; while in the abdomen and lower part of the trunk not one is recorded, though, of course, some may have escaped observation.

Thirdly. The greatest number of abnormalities combined in the same individual is 14 (in subject 32), a very muscular male, in whom the proportions are 10 in the muscles of the arms (including the *cleido-occipital*); 3 in those of the legs, and 1 only in the head and neck. The similarity between this subject and No. 1 of the last year's paper is remarkable. In the latter the number of departures from the ordinary type was 16, of

which all except 7 were found in the arms (including the *levator claviculæ*), 5 in the legs, and 2 in the head and neck. With the exception of the *levator claviculæ*, *costo-fascialis*, and *supra-costalis*, found in the last-mentioned subject, but not in No. 32, the correspondence (especially in the arms) between the different *lines of abnormal departure* also is sufficiently close to become significant, as the reader will have gathered in going through the preceding pages. In subject 4 of the Table, which presented the only specimen of the *levator claviculæ* found this session, only one other abnormality was found, viz. the *abductor of the fifth metatarsal bone*. This was also found associated with it in last year's subject, which presents otherwise a marked contrast in the number of its abnormalities.

In Nos. 5 and 7, the one a male and the other a female, there are nine variations respectively, of which, in No. 5, there is but one which is not in the arm; and in No. 7, four in the legs and three in the arms. In No. 2 are eight abnormalities, of which six are in the arms and the rest in the legs. In No. 26 are found seven, of which three are in muscles belonging to the upper extremity, and four in the legs. In No. 13 are six, all in the arms. In thirteen subjects none were found in the legs; and in four they were found in the legs only, to the extent, in one case, of four examples; and in all four subjects highly characteristic. None were found in the head, neck, or trunk only*.

The extent of *correspondence in combination of varieties* in the subjects arranged in the Table (taken in the horizontal lines) cannot be said to be striking. The variations seem to crop out here and there without much reference to each other. This may, however, be partly owing to the comparatively small number reviewed, and we should scarcely be safe in drawing deductions from it before a much greater number of subjects are treated in a similar way.

The correspondence seems to be the greatest in the arm and hand, which here also assume a prominence over the rest of the frame. This, however, may be due to the greater number of instances found in the upper extremity.

* In estimating the proportion of the abnormalities contained in the Table, the numbers and names at the head of the columns, together with those down the miscellaneous columns, must be compared with the total number of the muscles in the corresponding parts of the human body. Thus, taking the number of the voluntary muscles of the head, neck, trunk, and perineum, excluding those of the back, internal ear, larynx, and the intercostals (as subject to minor irregularities which have not been noted), we have about 72. Comparing these with the kinds of variety in the Table, viz. 10, we have a proportion of about 1 in 7. In the upper extremity we have 60 muscles; of lines of variation we have 26, or nearly half. In the lower extremity we have 61 muscles; of varieties 14, or not quite one-fourth.

The varieties classed in the Table include the greater number of those that have been previously observed by the author and others. *Ten* only, which have been mentioned in former papers as being subject to other irregularities than duplication and deficiency, are absent from this list.

This clearly shows that notable departures from the ordinary type of the muscular structures run in definite *grooves* or *directions*, which must be taken to indicate some unknown factor, of much importance to a comprehensive knowledge of general and scientific anatomy.

	Sex.	Platysma.	Digastric.	Cleido- occipital.	Sundries : single specimens.	Slips of pectoralis major (detached).	Pectoralis minor.	Slips of latissimus dorsi.	Biceps.	Brachialis anticus.	Flexor sublimis.	Flexor profundus.	I l p
1.	M.	1.	2 ant. bellies	3.	4.	5.	6.	7.	8.	9.	10.	11.	
2.	M.	...	...	...	...	B. condro- epitroch. <i>a</i>.	...	B. to pectoralis major, <i>b</i>.	...	...	...	...	B. lu
3.	F.	...	...	B.	...	...	...	...	...	...	...	...	...
4.	M.	...	...	R.	L. levat. clavic.	...	...	...	...	...	...	...	...
5.	F.	...	...	...	R. sternalis brutorum.	L. chondro- epitroch.	B. to hume- rus, <i>h</i> .	L. to pectoralis major.	...	...	B. to 1st lumbrie.	...	...
6.	M.	...	...	...	...	...	...	...	...	...	...	...	...
7.	M.	...	2 ant. bell. <i>m</i>.	...	L. compl., <i>n</i>	B. epigas- tric, <i>t</i>.	...	...	B. 3 hds	...	...	...	...
8.	M.	...	...	...	...	...	B. to hume- rus.	...	...	...	...	B. to flexor pollicis.	...
9.	M.	...	...	B.	R. stylo- pharyng., <i>s</i> .	B. epigas- tric, <i>t</i>.	...	...	...	...	B. to flexor pollicis.	...	...
10.	M.	...	...	...	...	...	...	L. to pectoralis minor, <i>v</i>.	...	...	...	...	...
11.	M.	...	...	...	...	...	...	...	...	...	...	...	...
12.	M.	...	...	...	...	...	...	...	...	...	...	...	...
13.	M.	...	...	...	...	...	B. to hume- rus.	...	...	...	B. to 1st lumbrie.	B. fr. Co- ron'd. pr., <i>a'</i>	...
14.	M.	...	...	...	...	...	...	...	...	B. to supina- tor long., <i>d'</i>	...	B. fr. Co- ronoid. pr.	...
15.	M.	...	...	...	...	...	...	...	...	...	...	...	...
16.	M.	...	...	B.	...	...	B. to hume- rus.	...	...	...	...	...	...
17.	M.	...	...	B.	...	...	...	...	...	B. to supina- tor long.	...	...	...
18.	F.	...	...	...	stylo-glos- sus, <i>f'</i>.	...	...	...	...	...	...	...	...
19.	M.	...	...	...	...	...	...	...	...	...	...	...	...
20.	M.	B. sternal slip, <i>g'</i>.	...	...	...	...	...	...	...	...	...	...	B. t p
21.	M.	...	...	...	...	...	...	...	...	...	...	...	...
22.	M.	...	...	B.	...	...	B. to clavi- cle, <i>k'</i>.	...	...	...	...	B. fr. Co- ronoid. pr.	...
23.	M.	...	...	B.	...	...	...	...	...	...	...	...	...
24.	M.	...	...	...	...	...	...	...	...	...	...	...	...
25.	M.	...	...	...	...	...	...	...	...	...	...	...	...
26.	M.	...	...	B.	...	...	...	...	B. 4 hds	...	...	...	...
27.	M.	...	...	B.	...	...	...	...	...	...	...	...	...
28.	M.	...	...	B.	B. costo-fas- cialis <i>r</i>.	...	...	B. to coraco-bra- chialis, <i>s'</i>.	...	...	...	...	...
29.	M.	L. to latiss. dorsi.	...	...	...	...	...	...	...	B. to pron. teres, <i>t'</i>	...	...	...
30.	M.	...	...	...	...	...	...	...	...	...	...	...	...
31.	F.	...	...	...	...	...	...	...	...	...	...	...	...
32.	M.	...	...	B.	splenius colli, <i>v'</i> .	L. epigas- tric.	...	B. to pectoralis major.	...	...	...	...	...
		2	2	11	7	5	5	5	2	3	3	4	

TABLE OF VARIETIES IN HUMAN MYOLOGY.

	Biceps.	Brachialis anticus.	Flexor sublimis.	Flexor profundus.	Flexor longus pollicis.	Lumbri- cales.	Flexor carpi radialis brevis.	Extensor carpi radialis.	Extensor carpi ulnaris.	Extensor minimi digiti.	Extensor indicis and medii digiti.	Extensor brevis digit. manus.	Intero
	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
is	...	...	...	...	...	...	...	...	...	...	...	...	...
is	...	...	...	...	B. to 1st lumbric., <i>c.</i>	B. 3rd bi- furcated.	...	...	...	B. 2 ten- dons, <i>d.</i>	...	L. 2 slips...	B. 1st biper
...	...	...	...	...	...	...	...	B. inter- medius, <i>g.</i>	...	...	...	...	...
s	...	...	B. to 1st lumbric.	...	...	R. 3rd bif. L. no 4th, <i>z.</i>	...	B. inter- medius.	...	B. to ring finger, <i>j.</i>	...	...	B. palm polle
...	...	...	...	...	...	...	R. rad. to ann. lig., <i>l.</i>	...	...	...	...	...	...
...	B. 3hds	...	...	B. to flexor pollicis.	...	...	...	...	...	...	...	...	...
...	...	...	B. to flexor pollicis.	...	...	...	...	...	B. to little finger, <i>u.</i>	B. 2 tendons	...	...	...
s	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	B. to 1st lumbric.	B. fr. Co- ron'd. pr., <i>a'</i>	...	...	R. rad. to 2nd metac.	...	...	...	B. ex. med. dig. <i>o'</i>	...	...
...	B. to supina- tor long., <i>d'</i>	...	...	B. fr. Co- ronoid. pr.	...	...	...	...	...	...	B. 2 tendons	...	...
...	B. to supina- tor long.	...	...	...	...	...	...	...	...	...	...	...	...
...
...	...	...	...	...	B. to flexor prof., <i>h'</i>	...	...	...	...	...	...	...	...
...	...	...	...	B. fr. Co- ronoid. pr.	...	B. 3rd bi- furcated.	...	L. acces- sorius, <i>i'</i> . R. inter- medius.	...	B. 2 muscles	...	...	Differen- tiated
...	...	...	...	...	...	...	...	...	...	B. 2 tendons	...	...	...
B. 4hds	...	...	...	...	...	...	...	...	B. to little finger.	B. 2 tendons	...	...	B. 1st c doubl
ra-	...	B. to pron. teres, <i>t'</i>	...	...	...	...	...	...	...	...	...	...	...
s	...	...	...	...	...	R. 4th, abs. 3rd to m. <i>w'</i>	R. rad. to 2d metac. R. rad. to 3d metac.	...	...	B. to ring finger.	R. ext. med. dig.	R. to mid. finger.	R. 1st c doubl
	2	3	3	4	2	4	4	4	2	7	3	2	5

Extensor carpi ulnaris.	Extensor minimi digiti.	Extensor indicis and medii digiti.	Extensor brevis digiti manus.	Interossei.	Sundries : single specimens.	Peroneus tertius.	Peroneus quinti.	Exten. long. pr. intern. hallucis.	Flexor longus accessorius.	Abd. os.met. quinti.	Sundries : single specimens.	No. in each subject.
16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	
...	B. 2 ten- dons, <i>d.</i>	...	L. 2 slips...	B. 1st p. bipenif.	palm. long. inverted, <i>e.</i>	...	...	...	...	B.	4th plant. inteross., <i>f.</i>	3
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	2
...	B. to ring finger, <i>j.</i>	...	...	B. palmar to pollex, <i>k.</i>	...	...	...	...	...	B. ....	...	3
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	R. epitrr. to olecr., <i>o.</i>	R. absent	B. to 5th metac., <i>p.</i>	...	B. from fasc.	...	perforat. of 5th, <i>r.</i>	1
...	...	...	...	...	...	...	...	...	B. from fib.	...	...	9
...	B. 2 tendons	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	B. above ext. prop., <i>w.</i>	...	...	...	2
...	...	...	...	...	...	B. to 4th metac., <i>x.</i>	B. complete	B. from ext. prop., <i>y.</i>	...	...	...	3
...	...	B. ex. med. dig. <i>δ'</i>	...	...	L. abd. min. dig., <i>c'</i>	...	...	...	...	B.	add. hal- lucis, <i>z.</i>	2
...	...	...	...	...	L. flex. br. pol., <i>e'</i>	...	...	...	...	...	...	6
...	B. 2 tendons	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	B. absent.	B. to 5th metac.	...	...	...	Doub. add. longus.	2
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	B. double abd. pol.	...	...	B. above ext. prop.	...	...	...	2
...	...	...	...	...	B. double abd. pol.	...	...	B. from ext. prop.	...	...	...	3
...	...	...	...	Differen- tiated.	...	...	...	B. from ext. prop.	...	...	...	2
...	...	...	...	...	...	...	...	...	...	B. ....	...	4
...	B. 2 muscles	...	...	...	ext. oss. met. doub., <i>h'</i>	...	...	B. complete	...	...	...	5
...	...	...	...	...	...	B. double tendon	...	B. complete	...	B.	Flex. long. halluc., <i>m'</i>	4
...	B. 2 tendons	...	...	...	...	...	...	B. complete	...	...	3rd lumbric- alis, <i>n'</i>	4
...	...	...	...	...	L. subscap., <i>p'</i>	...	B. complete	B. complete	R. from fib.	...	Flex. brev. halluc., <i>o'</i>	3
...	B. 2 tendons	...	...	B. 1st dors. double.	L. st. clav., <i>q'</i>	...	...	...	...	...	...	7
...	...	...	...	...	B. double abd. pol.	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	L. complete	...	...	R. perf. of 5th toe, <i>u'</i>	2
...	B. to ring finger.	R. ext. med. dig.	R. to mid. finger.	R. 1st dors. double, <i>x'</i>	R. flex. carp. uln., <i>y'</i>	B. to 4th met.	B. complete	...	...	B.	B. scan- sorius, <i>z'</i>	3
...	...	...	...	...	...	...	...	...	...	B. ....	...	14
2	7	3	2	5	11	5	5	10	3	7	9	132.

The figures which are placed at the end of each line in the Table refer to the number of varieties recorded in each entire subject. Those at the bottom of each column refer to the number of each variety of muscular abnormality.

EXPLANATION

Of the *Abbreviations* and *References* in the Table.

- R. Indicates the right side of the body on which the abnormality was found.
- L. Indicates the left side of the body on which the abnormality was found.
- B. Indicates both sides of the body on which the abnormality was found.
- a. Detached muscular slip from 6th cartilage, with separate insertion into humerus. Also in No. 5.
- b. Muscular slip from *latissimus dorsi* to insertion of *pectoralis major*. Also in Nos. 5 and 32.
- c. Tendon from *flexor longus pollicis*, giving origin to first lumbricalis.
- d. Single muscle with two tendons, both inserted into little finger. Also in Nos. 9, 25, and 27.
- e. *Palmaris longus*, with belly of muscle below instead of above.
- f. Fourth *plantar interosseus* arising from tendon of *peroneus longus*.
- g. *Extensor carpi radialis intermedius* arising (muscular) with *longior*, and inserted tendinous with *brevior*, or *vice versâ*. Also in No. 5, and the right side of No. 21.
- h. *Pectoralis minor*, giving tendinous slip to greater tuberosity of humerus; joining with the tendon of *supraspinatus* and capsular ligament.
- i. (Right side) third *lumbricalis* bifurcated to opposed sides of middle and ring-finger. (Left side) no *lumbricalis* to little finger. Also seen in No. 22.
- j. *Extensor minimi digiti* gave a tendon to the ring-finger on both sides. Also in No. 32.
- k. A first *palmar interosseus* (of Henle), under *flexor brevis* to pollex.
- l. *Flexor carpi radialis brevis*, vel *profundus*, as a fusiform muscle, arising from the oblique line of radius, and inserted into the annular ligament.
- m. Double anterior belly of *digastric*, decussating across the median line.
- n. Muscular slip from *complexus* to *rectus capitis posterior major*.
- o. Detached muscular slip from epitrochlea to olecranon over ulnar nerve.
- p. Tendinous slip from *peroneus brevis* to upper border of fifth metatarsal.
- q. *Flexor longus accessorius* muscular head arose from deep fascia covering *flexor longus digiti*.
- r. *Perforatus* tendon of fifth toe arose from tendon of *perforans*.
- s. Double *stylo-pharyngeus*, one behind the other.
- t. Detached slip of *pectoralis major*, arising from abdominal tendon at epigastrium, and inserted separately into tendon at humerus. Also in Nos. 9 and 32.
- u. Tendinous slip prolonged from *extensor carpi ulnaris* to *extensor* tendon of little finger. Also seen in No. 27.
- v. Detached slip from *latissimus dorsi* at ninth rib, to coracoid process at insertion of *pectoralis minor* (*chondro-coracoid*).
- w. *Extensor longus primi internodii hallucis*, arising from fibula and interosseous ligament above *extensor proprius hallucis*. Also in Nos. 18, 24, 25, 26, and 30.
- x. Tendinous slip of insertion of *peroneus tertius* to base of fourth metatarsal, as well as its usual insertion into the fifth. Also in No. 32.
- y. *Extensor longus primi internodii hallucis* tendon given off from that of *extensor proprius hallucis*. Also in Nos. 19 and 21.
- z. *Abductor hallucis* sent a large slip to base of first phalanx of second toe.
- a'. Muscular slip from coronoid process to *flexor profundus digitorum*. Also in the two next notices in the same column.
- b'. A distinct and separate *extensor of the middle digit*: in the next notice in the same column the *indicator* had two tendons, both inserted into the forefinger.

- c'*. High origin of *abductor minimi digiti* from fascia of forearm.
- d'*. Muscular slip connecting the *brachialis anticus* with the *supinator longus*. Also in the next notice in the same column.
- e'*. Superficial slip connecting the two portions of *flexor brevis pollicis*.
- f'*. Origin of *stylo-glossus* from the angle of the lower jaw.
- g'*. Subcutaneous slip from sternal fascia to cervical fascia.
- h'*. Musculo-tendinous slip from *flexor pollicis longus* to indicial portion of *profundus*.
- i'*. *Flexor carpi radialis accessorius*, a separate muscle connected with the origin of *longior*, to be inserted into the base of the metacarpal of *pollex*, giving a slip to *abductor pollicis*.
- k'*. Slip of *pectoralis minor* inserted into costo-coracoid membrane and clavicle.
- l'*. Double muscle, the lower inserted into annular ligament and origin of *abductor pollicis*.
- m'*. *Flexor longus hallucis* exchanged slips with *flexor longus digitorum*.
- n'*. Third *lumbricalis* arose from *flexor perforatus* instead of *perforans*.
- o'*. *Flexor brevis hallucis* sent a large slip to base of first phalanx of second toe.
- p'*. Muscular slip from insertion of *subscapularis* to the neck of the humerus and tendon of *latissimus*, an imperfect *coraco-brachialis brevis*.
- q'*. A distinct muscle from front of manubrium to lower border of clavicle, under fibres of *pectoralis major* (*Sterno-clavicular*). *Subclavius* also present.
- r'*. Distinct muscle arising from first rib with *sterno-thyroid*, and inserted into cervical fascia under *sterno-cleido-mastoid* (*costo-fascialis cervicalis*).
- s'*. Muscular slip from *latissimus dorsi* to join *coraco-brachialis* just below coracoid process, across the vessels of the axilla.
- t'*. On the left side a muscular slip from *brachialis anticus* to the fascia of the forearm; on the right side a fusiform muscle forming a high origin of the *pronator rad. teres*.
- u'*. *Perforatus* tendon of little toe from *flexor accessorius*.
- v'*. Muscular slip from *splenius colli* to *serratus magnus*.
- w'*. Third *lumbricalis* to inner side of middle finger. Fourth absent altogether.
- x'*. First dorsal *interosseus* double. Also in 27.
- y'*. Tendinous slip from *flexor carpi ulneris* to base of fourth, as well as the fifth metacarpal
- z'*. Separation of anterior fibres of *gluteus minimus*, forming distinct muscle.

X. "On the Muscular Arrangements of the Bladder and Prostate, and the manner in which the Ureters and Urethra are closed."

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(Abstract.)

The present communication, which is based on an extensive series of dissections* and illustrated by photographs, is intended to show that the muscular fibres of the bladder, contrary to the received opinion, are spiral fibres, and with few exceptions form figure-of-8 loops. The loops are variously shaped, according as they are superficial or deep, the more superficial loops being attenuated or drawn out so as to resemble longitudinal or

* Of these upwards of sixty are preserved in the Museum of the Royal College of Surgeons of England.